U.S. Environmental Protection Agency
Science Advisory Board
Integrated Risk Project Peer Review Subcommittee

Summary Minutes of Public Meeting
Thursday and Friday, July 1-2, 1999

Committee: Integrated Risk Project Peer Review Subcommittee (IRPPRS) of the U.S. Environmental Protection Agency's Science Advisory Board (SAB). (See Roster - Attachment A)

Date and Time: Thursday and Friday, July 1-2, 1999 8:30 am to 5:00 pm, Eastern Time (See Federal Register Notice - Attachment B)

Location: Science Advisory Board Conference Room 3709 Waterside Mall, US EPA, 401 M Street, SW, Washington, DC 20460

Purpose: To review the "Integrated Environmental Decision-making in the Twenty-first Century" report and it's companion document "Integrated Environmental Decision-making in the Twenty-first Century: Summary Recommendations" (See Meeting Agenda - Attachment C).

Attendees: - all current Members were present except Dr. Anderson- (see Attachment A).

Members Attending:

Dr. M. Granger Morgan, Chair
Dr. William E. Bishop
Dr. Donald F. Boesch
Dr. Richard J. Bull
Dr. Terry Davies
Dr. John D. Graham
Dr. Catherine Kling
Dr. Debra Knopman
Dr. Morton Lippmann
Dr. Warner North
Dr. Richard Revesz
Dr. Bruce Tonn

SAB Staff:

Dr. John R. Fowle III (Designated Federal Official)
Ms. Wanda R. Fields (Management Assistant)

Members Not Attending:

Dr. Henry A. Anderson

See Meeting Sign-in Sheets for other attendees (Attachment D).

Meeting Summary:

The meeting followed the issues and general timing as presented in the meeting Agenda, except where otherwise noted (see Meeting Agenda - Attachment C). Written comments were submitted to the Committee by Barbara Harper, Yakama Indian Nation and Stuart Harris, Confederated Tribes of the Umatilla Indian Reservation (see Attachment E). There were no public comments presented to the Committee orally.

Welcome and Introductions - At 8:35 am Dr. Granger Morgan, the IRPPRS Chair, opened the meeting. He welcomed everyone and briefly stated that the purpose of the meeting was to review the "Integrated Environmental Decision-making in the Twenty-first Century" report and it's companion document "Integrated Environmental Decision-making in the Twenty-first Century: Summary Recommendations". He noted that the Integrated Risk Project is the third in a series of reports. The first was the EPA comparative risk project conducted by Agency staff in the late 1980's. The second was the 1990 SAB "Reducing Risk" project. The Administrator asked the SAB to conduct the "Integrated Risk Project" (IRP) 3 years ago, and the effort resulted in the documents reviewed during this meeting. Because the report was prepared by the SAB it was decided that the EC members who did not work on the IRP report, supplemented by consultants with appropriate expertise, would comprise the peer review panel and act as the Executive Committee for the peer review vetting and approval of this report.

Following Dr. Morgan's welcoming remarks, Dr. Jack Fowle, the Designated Federal Official (DFO), covered administrative matters, including describing the materials contained in the meeting folder (see Meeting Folder Contents List - Attachment F). The members held a public disclosure discussion and the other people attending the meeting introduced themselves.

Overview from the Integrated Risk Project Steering Committee - Dr. Gene Matanoski, who chaired the IRP Steering Committee that prepared the reports, summarized the genesis of the project and gave an overview of the reports (see Appendix G - Transparencies from IRP Steering Committee). The Agency asked the EC to update Reducing Risk report; identify risk reduction opportunities and strategies; identify uncertainties and data quality issues; assess benefit/costs for each; and propose a new framework for assessing the value of ecosystems. In addition, the Senate Appropriations Committee wanted a list of ranked risks to use as a tool to help them prioritize the budget. This latter request proved not to be feasible to comply with.

She noted that several SAB Committees were involved in the project. The Ecological Processes and Effects Committee and the Environmental Health Committee worked to find a common way to rank health and ecological effects. Although many

commonalities were found and some integration was possible it was not possible to develop a common ranking.

After Dr. Matanoski's introduction the Committee considered the Charge Questions. A summary of the resulting discussions is presented below.

Charge Question 1: Does the integrated framework document as a whole provide a useful and scientifically valid concept for the Agency to develop processes and procedures for integrated environmental decision-making? - The committee noted that the report chapters do not fit together tightly. It was also suggested that it might be appropriate to change the title.

Dr. Matanoski noted that the IRP Steering Committee did not formally engage the Agency nor the public as they planned and prepared the overall report. However, Risk Reduction Options Subcommittee discussed how the framework might be used with staff from EPA's Office of Pesticides Program.

The peer reviewers noted that chapter 4 is poorly integrated to the rest of the document.

The Committee took a break between 10:00 and 10:15.

Charge Question 2: Do the chapters on ecology health, risk reduction options, report card, and the deliberative portion of the valuation chapter describe adequate and useful methods for addressing/ranking risks? -

a) Health - Valerie Thomas joined the meeting by phone to discuss the health chapter. The health subcommittee developed a highly simplified non-quantitative approach for ranking risks. They proposed a web-based approach for this purpose and developed data sheets to inform rankers about the risks. The procedure asks participants to rate health risks and their confidence in the ranking from very high to very low. The process results in a 2-dimensional display for each stressor of that stressor's risk ranking and the confidence in that ranking.

The peer review committee inquired about the variation between responses. Did committee try a real life example? Dr. Thomas said yes, but the results were not put in the chapter because the Committee thought the results would carry more weight than it should because only a few raters took part in the pilot rating.

The peer review committee noted that some parts of EPA do quantitative rankings already, for instance the Office of Air Quality Planning and Standards. The peer reviewers questioned why such results were ignored. They also questioned how the discussion of fuzzy sets contributed to the document. Dr. Thomas noted that one

could put a lot more analysis into the approach than is included in chapter. The data sheets are meant to do this. With respect to the discussion of fuzzy logic, it was not part of method *per se.*

The peer review committee felt that more context is needed for this chapter. Also, they were concerned about which "experts" do the ranking. One would likely get a different array of opinions from expert toxicologists vs. epidemiologists, etc. A reliable way to ensure a balanced panel is needed. How do you select the experts, and why ask scientists to make value judgments?

In response, Dr. Matanoski noted that non-scientists can participate in the exercise. It is not limited to scientists. Dr. Thomas reported that it was originally thought that just scientists would use the approach, but as the Committee proceeded it realized that the approach could be used by non-scientists as well.

Dr. Kling noted that what the health subcommittee did could be quite useful for engaging the public in economic analyses. A random sample of the population could be asked what they want to spend money on. Such a web-based approach could be very useful if the information on the data sheets is good enough.

Some other panel members were concerned about using such an approach in an unskilled way. For instance, almost none of the literature cited in this chapter included references to decision analysis. They wondered how well the chapter was grounded in this literature.

b) Ecology - Dr. Harwell then described the approach developed by the IRP for the relative risk ranking of ecological systems. The goal was to develop an approach that was more transparent than the approach used in the reducing risk or unfinished business projects. A transparent process lets others see how the rankings were done and allows other rankers to change the parameters if they desire. The IRP tried to develop an interface between ecology and human health for comparative relative risk ranking by looking at a common set of stressors and the correspondence of risk comparison factors. This was abandoned because of the need to make value judgments involving trade-offs between health and environmental damage.

The peer review committee noted that there are hidden values in the ecological rankings and asked why the valuation chapter was not merged with the economic chapter. It seems from an economic perspective that the risk ranking of a lake with an impact from acid deposition would depend on value of lake (e.g. recreational value). However, while other impacts such as stress to endangered species would have no direct economic impact they would have other impacts. Dr. Harwell noted that the Committee tried to separate societal, economic values from ecological value.

The peer review committee asked whether the IRP Committee attempted to rank ecosystems? Dr. Harwell said no, but the method would allow you to do so. The peer review committee felt that the approach was a step in the right direction but also felt that it was important to think about the imbedded implications of the indices. For instance, the criteria are not independent. Also a number of the decisions that were made about ecosystem value were based on the reviewers values and judgment. The choices made have an enormous effect on the outcomes. It was noted that a change to one criterion changed the rankings dramatically. It was also felt that the interconnnectedness component of integration was not sufficiently developed in the rankings, although secondary stress reduction does begin to get at this.

Overall the reviewers felt that the basic idea of the eco risk rankings is very good and deserves to be the basis of a significant EPA follow-up. The approach is heuristic and doesn't refer to the Multi-attribute Utility Theory (MAUT) and behaviorial literature, but this is not a serious criticism if the chapter is to be read as a first approach and if it suggests follow-up research.

Dr. Harwell stressed that his committee did not attempt to develop the "answer" with respect to multipliers. Rather they stressed an approach to developing them that was transparent so if one disagreed with the specific multipliers he/she could develop his/her own. Dr. Harwell felt that the IRP "eco" methodology is ready for the Agency to apply, but he does not claim that it is a better tool than other approaches nor does it stand alone. One can't take the resulting ecological risk rankings and use them to allocate resources.

c) Risk Reduction - Dr. Kachal then described the Risk Reduction Options Subcommittees's (RROS) efforts. The RROS mission was to help EPA balance risk reduction opportunities against other objectives and to develop a methodology for ranking risk reduction options. They considered a suite of risk reduction options beyond engineering fixes (e.g., communication/education, enforcement, market incentives). They also described a 10-step process for identifying risk reduction options, ranking them and evaluating performance. As with the eco subcommittee, the RROS felt that transparency is pivotal. RROS felt that it was necessary to quantify or at least semi-quantify the risks considered for risk reduction options. Their belief is that if this is not done accomplishments can't be evaluated at the end of a project. Similarly, he noted the importance of defining uncertainty The first step is to define the problem well. If uncertainty can't be measured at least semi-quantitatively the RROS felt that one would not be able to justify spending time and effort on it. He noted that "risk" is not the only criteria for ranking risk reduction options. Other considerations are important too. The RROS also felt that one should not focus on reaching the "optimum" approach to reducing risks but rather on adaptive approaches.

d) Report Card - Dr. Deisler then described the Committee's effort to develop guidance on "report cards" which are needed to evaluate whether goals are being met.

Report cards can help at several levels to evaluate whether risk reductions are occurring via less release, lower exposures, fewer adverse outcomes, etc.

The review committee felt that there are major problems with the report card discussion. With few exceptions, such as lead, outcomes for environmental health cannot typically be shown to decline as a result of environmental control efforts, because improvements are masked by random variability.

The meeting broke for lunch at 12:10 and reconvened at 1:00 p.m. when Dr. Robert Stavins joined the meeting by phone to discuss Charge Question 4.

Charge Question 4: Does the economics chapter provide an adequate and useful primer for economic analysis? Dr. Stavins limited his comments to the economics information contained in chapter 4 only. He gave kudos to Paul Portney for writing the chapter. Its purpose was to develop a primer for non-economists in the agency on economics and to a lesser degree on cost benefit analysis.

The review committee felt it was important to make it clear that the chapter is a primer for non-economists and that it is not meant to be a seamless part of an overall document. The members also felt that there is a major need to focus more on the uncertainties.

Charge Question 5: Does the chapter on valuation provide an adequate and useful philosophy describing how to incorporate values into decision-making, clearly articulating that more than science is needed in the decision-making process? - Dr. Milton Russell joined the meeting by phone and noted that the Valuation Subcommittee was diverse in its expertise. Its role was to explore the roles of valuation in decision making. They looked at a massive literature, most of which came to a dead end regarding the valuation of natural resources. Their task was to distill this information into a useful set of messages for the Agency. They soon disabused themselves of the notion they would find a magic bullet, so their focus shifted to providing the Agency with approaches, not answers. Dr. Russell believes the Subcommittee's messages to be powerful. Benefit/cost analysis is helpful but does not provide the answer. Multiple approaches will be required. The overriding principle is that values permeate the environmental protection process from first to last. The detailed sections of the report focus on the nature of values and how preferences evolve from interaction. The valuation framework is straightforward. Much attention is paid to the 4th section – the deliberative process. The final section of the chapter introduces additional approaches that the subcommittee found worthy of additional research and follow-up. In summary, the Valuation Subcommittee found that operationally eliciting values is a messy process. It doesn't lead itself to an orderly process from first principles. While an art, the process of valuation is not free standing. You know it when you see it, but it does require some thought and discipline. There are boundaries against which the Agency can decide what it doesn't need to do.

The peer review committee liked the five points laid out by the Valuation Subcommittee. Dr. Russell noted that the discussions were full, frank etc., but that the participants were not satisfied that had solved the problem. Early on they decided to take a consensus approach. Ultimately they were frustrated, because their original hopes were to develop a more coherent, less fractionated approach. In the end they were satisfied that it was the best they could do, but not that it was the best that could be done.

The peer review committee noted that in contrast to chapters 4 and 5, which assume that people have well articulated preferences, this chapter assumes they don't and talks of the need to help people elicit such preferences. However, it does not talk about the need to inform people to help them decide. The chapter might be strengthened if it suggested wedding deliberation to education and decision support.

Charge Question 3: Does the document provide an adequate and useful description for how this information might be linked in decision-making? - The peer review committee felt that certain improvements could be made, including involving stakeholders at the beginning of problem formulation. The committee also wondered about setting boundaries, especially during problem formulation. Dr. Kachal noted that the RROS chapter does discuss setting boundaries. Dr. Harwell noted that problem formulation is the key to setting boundaries. Setting boundaries is an explicit part of problem formulation. Dr. Matanoski noted that the IRP authors didn't want the document to fall on deaf ears. Therefore, they wanted to make their document useful no matter what the EPA application. The peer reviewers noted that the summary document makes it look like bounding the problem is cast in problem formulation. Some language that deals with this should be placed up front in the summary document

Dr. Matanoski noted that for those who participated from the SAB, and had their horizons expanded, this was a very useful and successful exercise. However, the result is not an integrated document. It provides some tools and techniques to be further researched and developed, but more care should be taken in the wording to avoid raising false expectations. The criteria need to be more carefully defined regarding what is useful and useable. Also, nowhere does the document say what kinds of decisions are being referred to. EPA does not have much latitude in its efforts. Most major decisions made at EPA are framed in the legal and regulatory milieu. Also decisions are being made at state and local levels, as well as by businesses and individuals, not just by EPA. But more than any other agency, EPA is in a good position to leverage environmental protection activities. Maybe the report could include some suggestions with specific examples about how EPA can use its current authorities to integrate its efforts to reduce environmental risks.

General Discussion - Dr. Morgan then asked the peer review committee if the charge questions were sufficiently encompassing to incorporate the comments the

committee wishes to make. Several poiints were made that Dr. Morgan felt could be handled in the response to the various charge questions.

The peer review committee then took a break between 2:45 – 3:00 p.m.

Dr. Morgan then divided the peer review committee into small groups and asked them to get together later in the day to write their parts of the document with the objective of having a draft report by the first thing the next day.

Several recommendations and points were made by the peer review committee members, including:

1. the focus of the effort should be placed on the summary report and its recommendations because that is what will be read by powers that be.
2. the eco chapter is a major contribution. Emphasize the eco component and de-emphasize the health component
3. the material in volume 2 could be turned into a research agenda making a bigger contribution than the summary document. Alternatively Volume 1 could include pathways, pointers, etc. to Volume 2 making it a research direction piece instead of a prescription piece.
4. modest editing and revision is the best to expect for an outcome
5. change the title to reflect more of a work in progress
6. because there has been little experience with ecological risk ranking, it would be useful to run through more case studies
7. there are several overarching themes
8. there is a lack of integration
9. a number of words are used that have very different meanings (e.g. values – to economists it means tradeoffs while to others it means how one feels)
10. there is a mixing of where does hard science stop and where does social science begin
11. to be really helpful, pick the major things, talk about them as a group and when do write-ups try to fit them in
12. the amount of behavioral social science content considered was small and this is reflected in the report. Both methodological chapters (eco and health) seem to be reinventing the wheel because they didn't acknowledge the existing literature. This provides an important message for the SAB. To the extent it moves into the interface between science and social science it needs to get social scientists on the Board.
13. the document implies you can do things that cannot be done. It sets science up for failure
14. the report should note that the Agency has already tried to do some of the things recommended in the report. The IED report does not give the Agency nearly enough credit.
15. report cards are necessary but not sufficient. Coupling observations with goals is interesting and potentially useful, but how would you do it?

Dr. Morgan noted that he and the rest of the peer review committee appreciated the comments of the IRP committee members and he invited the SAB staff involved in the report production to comment. He then adjourned the meeting for the day 4:56 p.m.

Day 2 - On Friday July 2 the meeting convened at 9:08 a.m. The peer review committee reviewed and discussed the first draft of their report. Dr. Morgan asked the various groups to summarize the main points for the response to the charges they were assigned.

Charge 2 – The approach described in the Eco chapter is a positive step in the right direction. However, it is only one of many approaches that could be taken. It does not recognize that there are normative issues and that judgments are made even in science. The report should be careful to discuss this when describing the stressor ranking. This is an ideal topic for an ORD RFP. The health component concept has merit, but it is practically impossible to use because of data inconsistency with respect to endpoints, and the difficulty of capturing complex information accurately and well for different review panels. The Report card is essential for evaluating Agency efforts to control the release of pollutants up through exposure to the receptor but it is important to acknowledge that effects report card will seldom be possible. It will not be the norm. The discussion of fuzzy sets does not add much to the report, and the report gives short shrift to a number of Agency efforts (e.g., OAQPS' project to elicit probability analysis from experts).

Charge 3 – The document does not contain sufficient content from chapters 2 and 7 to show how the agency can use the concepts for decision-making. Also, the terminology and approaches differ between these chapters.

Charge 4 – The economics chapter is a solid primer, but it is not integrated with the rest of the report and it doesn't address the original charge to get at cost analysis.

Charge 5 – The case made that more than just science is needed for decision-making. The Chapter does a good job describing how one can handle values. However,:

1. it is not integrated with the overview report
2. it is not integrated with itself
3. the topics are not well organized
4. "value" is defined in different ways
5. the chapter is weak in its description of process issues e.g., how can EPA and others use the approach
6. the chapter is weak on content as it ignores approaches developed by others
7. the chapter does not directly address whether EPA should take a role in debate
8. EPA has regulatory flexibility as discussed but issues raised about rights and

preferences are not addressed in such a way as to show the reader that there are underlying issues

9. the discussion of biomedical discussion of values is not needed

The committee took a break from 10:30 until 10:45. The groups then met again until 12:15 pm when the committee held a working lunch.

Discussion with Staff - Stephanie Sanzone noted that there was an appendix dealing with stressor work sheets which committee did not get. She will prepare and send out in a week or two. Dr. Morgan noted this would help the Subcommittee when it met via a conference call in 2 weeks.

Dr. Morgan adjourned the meeting at 1:35 p.m.

I certify that these minutes are accurate to the best of my knowledge.

S/

Dr. John R. Fowle III
Designated Federal Official
Science Advisory Board

S/

Dr. M. Granger Morgan, Chair
Integrated Risk Project
Peer Review Subcommittee

Attachments:

A - IRPPRS Roster
B - Federal Register Notice
C - Meeting Agenda
D - Meeting Sign-in Sheets
E - Comments from Drs. Harper and Harris
F -Meeting Folder Contents List
G -Transparencies from IRP Steering Committee